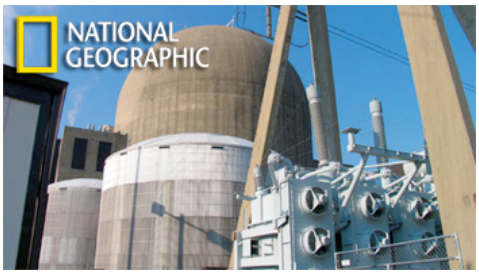
LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: March 1 - March 8, 2010

LLNL's Zucca stars in National Geographic show



LLNL scientist Jay Zucca is featured in the National Geographic Explorer documentary episode, "Inside the Nuclear Threat." The program, narrated by University of California, Berkeley physics professor Richard Muller, will air at 6 p.m. Tuesday, March 9, on the National Geographic Channel.

Zucca, the program director for Nonproliferation within the Global Security Principal Directorate, discusses how seismology can detect underground nuclear tests.

Filming for the documentary was conducted at the Cook nuclear power plant in Bridgman, Michigan; the port of Antwerp in Belgium, where cargo screening is under way; and at the National Nuclear Security Administration.

For more information about the program, go to the National Geographic Channel Website at http://channel.nationalgeographic.com/series/explorer/4818/Overview.

One Wild ride

Combined long- and short-exposure images captured during the Stardust flyby of the comet Wild 2. Image credit: NASA/JPL

Recent results from the analysis of comet particles paints a topsy-turvy picture of the early solar system.

Though the NASA Stardust mission was expected to provide a unique window into the early system when it returned to Earth in 2006, instead the particles show that inner solar system dust migrated out to the comet belt (close to Pluto) billions of years ago.

Jennifer Matzel of LLNL shows the dust from comet 81P/Wild 2 returned some surprising results:

Instead of returning a mix of solar system condensates, amorphous grains from the interstellar medium, and true stardust -- crystalline grains originating in distant stars, the results indicate that comet Wild 2 instead contains an abundance of high-temperature silicate and oxide minerals similar to minerals in carbonaceous chondrites.

To read more, go to
http://content.usatoday.com/communities/sciencefair/post/2010/02/nasa-probe-dust-reveals-comet-origins/1

Smart Planet focuses on smart semi-trucks

Semi-trucks transport nearly all the goods that Americans use. But the fuel used and exhaust emitted are challenges to the economy and the environment. The Lab is answering that call by increasing fuel efficiency in semi-trucks through smarter aerodynamics.

Nearly 15 years ago, the Department of Energy started investing in aerodynamics of heavy vehicles. LLNL computer simulations have identified critical drag producing regions around semi-trucks, such as the trailer base, underbody and the gap between the tractor and trailer.

Partnering with trucking company Navistar, Lab scientists are testing some of the best devices to cut down on drag in the world's largest wind tunnel at NASA Ames.

By increasing fuel efficiency by 12 percent, which could save the nation $10 billion in fuel savings, the environment would get the bonus of 36 million fewer tons of carbon dioxide released into the atmosphere annually, roughly the same amount of CO2 that is emitted from four 1-gigawatt power plants every year.

To watch the video, go to
https://publicaffairs.llnl.gov/news/lab_report/movies/smartplanet.mov

Creating the power of the sun in the lab

Inside the NIF target chamber.

BBC Radio recently featured a story on the 50th birthday of the laser. The most ambitious is the use of a laser to drive nuclear fusion, the process that powers the sun, replicated in the lab, such as what is planned in LLNL's National Ignition Facility.

NIF Director Ed Moses explained how lasers can create fusion by driving two hydrogen atoms together until they are smaller than a human hair. In the sun, you have a big ball of gas that uses gravitational energy to squash everything together to create very high temperatures, very high densities and very high pressures. And that nuclear reaction turns mass into energy.

"Our goal is to do that with lasers on earth," said Moses, who ultimately expects to create clean energy under conditions that are hotter, denser and higher pressures than the sun.

Fusion experiments are scheduled for later this year.

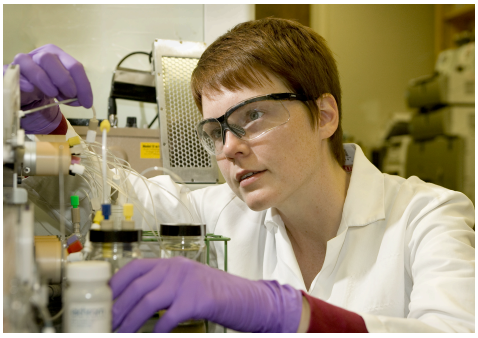
To listen to the interview, go to
https://publicaffairs.llnl.gov/news/lab_report/movies/BBCRadio_AAAS.mov

Latest *Newsline* available

NEWSLINE

Newsline provides the latest Lab research and operations news. See the most recent issue at https://newsline.llnl.gov

Photo of the week:



Dirty job, but someone's gotta do it: Julie Gostic, a postdoctoral fellow at the Laboratory, works with a flow-through chemical automation system. This system chemically separates specific elements from other contaminants in a solution that may be left over from a soil sample.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail mailto:labreport@llnl.gov.

The *Livermore Lab Report* archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2010index.html